Claims

I claim:

1. A dedusting unit for a laser optical element, comprising:

a high-voltage duct comprising a high-voltage conducting core having a first end and a second end and an insulator element disposed around the core, the first end of the core being connectable to a high voltage power supply; and

a wire loop electrically connected to the second end of the high-voltage core.

2. A dedusting unit according to claim 1, wherein the high-voltage duct comprises a coaxial duct.

3. A dedusting unit according to claim 2, wherein the insulator element of the high-voltage duct comprises a cylindrical ceramic tube and the core is coaxially disposed within the ceramic tube.

4. A gas laser, comprising:

a tube having a first end wall at one end and a second end wall at the other end and defining a cavity for containing a laser gas;

an elongated high voltage electrode within the tube and extending parallel to the longitudinal axis of the tube;

an elongated ground electrode within the tube, the ground electrode extending parallel to the high voltage electrode and being spaced apart from the high voltage electrode to thereby define a gas discharge gap therebetween;

a laser resonating path in axial alignment with the gas discharge gap;

a first laser optical element disposed in the laser resonating path and having a first side exposed to the cavity formed by the tube; and

a dedusting unit comprising (1) a high-voltage duct comprising a high-voltage conducting core having a first end and a second end and an insulator element disposed around the core, the first end of the core being connectable to a high voltage power supply, and (2) a wire loop electrically connected to the second end of the high-voltage core; wherein

the dedusting unit is mounted to the laser tube so that the wire loop is disposed inside the tube in proximity to the first side of the optical element, and the wire loop is transverse to the resonating path so that the resonating path passes through the wire loop.

5. A gas laser according to claim 4, wherein the optical element comprises an optical element selected from the group consisting of a fully reflective mirror, a partially transparent, partially reflective mirror, and a fully transparent window.

6. A gas laser according to claim 4, wherein the optical element is mounted on the first end wall and comprises an optical element selected from the group consisting of a fully reflective mirror, partially transparent, partially reflective mirror and a fully transparent window.

7. A gas laser according to claim 6, further comprising:

a second optical element disposed in the laser resonating path and mounted on the second end wall of the laser tube, wherein the second optical element includes a first side exposed to the cavity formed by the tube, and the second optical element is selected from the group consisting of a completely reflective mirror, a partially transparent, partially reflective mirror, and a fully transparent window; and

a second dedusting unit mounted to the laser tube so that the wire loop is disposed inside the tube in proximity to the first side of the second optical element, and the wire loop is transverse to the resonating path so that the resonating path passes through the wire loop.

8. A gas laser according to claim 4, wherein the high-voltage duct comprises a coaxial duct.

9. An gas laser according to claim 5, wherein the insulator element of the high-voltage duct comprises a cylindrical ceramic tube and the core is coaxially disposed within the ceramic tube.

10. A gas laser according to claim 4, wherein the high voltage duct of the dedusting unit extends through the first end wall.

11. A gas laser according to claim 6, wherein the high voltage duct of the dedusting unit extends through the first end wall.

12. A gas laser according to claim 4, wherein the laser gas is an excimer laser gas.

13. A method for installing a dedusting unit for a laser optical element of a gas laser comprising a tube having a first end wall at one end and a second end wall at the other end and defining a cavity for containing a laser gas, a laser resonating path substantially parallel to the longitudinal axis of the tube and along which coherent light can resonate, and a laser optical element having a first side exposed to the cavity formed by the tube, the laser optical element being mounted to the first end wall so that the first side of the optical element is disposed in the laser resonating path, and wherein the dedusting unit for the optical element comprises (1) a high-voltage duct comprising a high-voltage conducting core having a first end and a second end and an insulator element disposed around the core, the first end of the core being connectable to a high voltage power supply, and (2) a wire loop electrically connected to the second end of the high-voltage core, the method comprising the steps of:

flattening the wire loop into an elongated shape so that the width of the wire loop is smaller than the diameter of a bore hole extending through the first end wall,

inserting the wire loop through the bore until the elongated wire loop is inside the tube;

expanding the elongated wire loop to a desired form which is transverse to the resonating path; and

positioning the wire loop of desired form so that it is in proximity to the first side of the optical element and the laser resonating path passes through the wire loop.

14. A method according to claim 13, wherein the desired form is a circular form.

15. A method according to claim 13, wherein the laser gas is an excimer laser gas.

16. A method according to claim 13, wherein the bore extends radially through the first end wall.

17. A method according to claim 13, wherein the optical element comprises an optical element selected from the group consisting of a fully reflective mirror, a partially transparent, partially reflective mirror, and a fully transparent window.

18. A method for installing a dedusting unit for a laser optical element of a gas laser comprising a tube having a first end wall at one end and a second end wall at the

other end and defining a cavity for containing a laser gas, a laser resonating path substantially parallel to the longitudinal axis of the tube and along which coherent light can resonate, and a laser optical element disposed in the laser resonating path and having a first side exposed to the cavity formed by the tube, wherein the first end wall has a port aligned with the resonating path and a bore hole for installing the dedusting unit therethrough, and the optical element is mounted to the first end wall in alignment with the port, and wherein the dedusting unit for the optical element comprises (1) a high-voltage duct comprising a high-voltage conducting core having a first end and a second end and an insulator element disposed around the core having an outer diameter which is less than the diameter of the bore hole, the first end of the core being connectable to a high voltage power supply, and (2) a wire loop electrically connected to the second end of the high-voltage core and having a diameter greater than the diameter of the bore, the method comprising the steps of:

flattening the wire loop into an elongated shape so that the width of the wire loop is smaller than the diameter of the bore;

inserting the dedusting unit, wire loop end first, through the bore until the elongated wire loop is inside the tube and at least a portion of the high-voltage duct is within the bore;

expanding the elongated wire loop to a desired form which is transverse to the resonating path; and

positioning the wire loop of desired form so that it is in proximity to the first side of the optical element and the laser resonating path passes through the wire loop.

19. A method for installing a dedusting unit for a laser optical element of a gas laser comprising a tube with a first end wall and a second end wall and a bore hole extending through the first end wall, wherein the dedusting unit for the optical element comprises (1) a high-voltage duct comprising a high-voltage conducting core having a first end and a second end and an insulator element disposed around the core having a diameter which is less than the bore hole in the first end wall of the tube, the first end of the core being connectable to a high voltage power supply, and (2) a flattened wire loop electrically connected to the second end of the high-voltage core having a diameter smaller than the bore diameter, but which is capable of being expanded to a diameter greater than the bore diameter, the method comprising the steps of:

inserting the wire loop through the bore until the elongated wire loop is inside the tube;

expanding the elongated wire loop to a desired form which has a diameter greater than the bore diameter and which is transverse to a laser resonating path that is substantially parallel to the longitudinal axis of the tube; and

positioning the wire loop of desired form so that it is in proximity to an optical element disposed in the laser resonating path and so that the laser resonating path passes through the wire loop.